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# TENNESSEE'S Forest Products Industry: Performance and Contribution to the State's Economy, 1970 to 1980

Wilbur R. Maki, Con H Schallau, Bennett B. Foster, and Clair H. Redmond



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## Abbreviations

### States

AL	Alabama
AR	Arkansas
FL	Florida
GA	Georgia
KY	Kentucky
LA	Louisiana
MS	Mississippi
NC	North Carolina
OK	Oklahoma
SC	South Carolina
TN	Tennessee
TX	Texas
VA	Virginia
SO	South
US	United States

### Industries

FPI	Forest Products Industry
LWP	Lumber and Wood Products
PAP	Paper and Allied Products
WF	Wood Furniture

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## Abstract

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The forest products industry is one of Tennessee's basic industries; in 1980, for example, it accounted for about 1 of every 12 basic jobs. Furthermore, Tennessee was one of the majority of Southern States in which the forest products industry improved its competitive position during the 1970's. In 1977, productivity growth of the paper and allied products segment far exceeded the average for the forest products industry as well as the average for all industries.

Keywords: Forest products industries, economics (forest products industries), employment (forest products industries), Tennessee.

## Preface

This report briefly describes Tennessee's forest products industry—its composition, location, evolution, and relation to economic activity elsewhere in the State, the South, and the Nation.

This is one in a series of reports for each of the 13 Southern States. These reports are companions to an analysis of the interregional competition in the forest products industries of the South and the Pacific Northwest.

Estimates of employment and earnings shown in this report were derived from U.S. Department of Commerce data. All references to dollar amounts are in constant 1977 dollars.

## Highlights

- The forest products industry is one of Tennessee's basic industries; that is, it exports products and by doing so brings in new dollars to support economic growth and development. In 1980, the forest products industry accounted for about 1 of every 12 of Tennessee's basic jobs.
- Tennessee's forest products industry is comprised of paper and allied products, lumber and wood products (not including mobile homes), and wood furniture manufacturing. Employment was almost equally distributed among the three segments in 1980, but paper and allied products accounted for nearly half of the total earnings. Employment decreased in the wood furniture segment between 1970 and 1980 but increased in the other two segments.
- In 1977, paper and allied products had the largest share of the \$1.1 billion of value added by Tennessee's forest products industry.
- In addition to having above-average growth in employment, the forest products industry increased in value added between 1972 and 1977. The value added increased by 10 percent, but only on the strength of paper and allied products—value added by the wood furniture and the lumber and wood products segments actually decreased.
- The rate of growth in average earnings was about the same for Tennessee's forest products industry as for the Nation, but somewhat less than the average for the South. The rate of change for wood furniture was considerably less than that of the entire forest products industry in the United States and the South.

- Paper and allied products had, by far, the highest productivity in Tennessee's forest products industry. Productivity per worker hour was more than twice the average for the State's forest products industry. Productivity in the wood furniture and lumber and wood products segments—which were low to begin with—decreased between 1972 and 1977.
- Tennessee was one of the majority of Southern States in which the forest products industry improved its competitive position during the 1970-80 period.
- Between 1972 and 1977, growth in productivity of paper and allied products (43 percent) far exceeded the average for the forest products industry as well as the average for all industries in the Nation. Productivity in both of the other segments declined.

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## The Forest Products Economy of Tennessee

### The Work Force

Tennessee's estimated full- and part-time work force in 1980 was comprised of an estimated 2.2 million employees and proprietors (see appendix table 1 for sources of employment and earnings data). Tennessee's work force grew faster between 1970 and 1980 than did the national average (24.8 versus 22.3 percent). Total earnings--wage and salary payments and proprietorial income--grew much faster than the national average. Measured in constant 1977 dollars, the State's earnings increased by 35.2 percent compared with 27.4 percent for the Nation. As can be seen in the following tabulation, manufacturing, services, retail trade, and State and local government were the State's four largest employer categories, as they were for the Nation.

Employers	Percent of total employment 1980	
	Tennessee	U.S.
Major industries:		
Manufacturing (including the forest products industry <sup>1</sup> )	23.4	19.2
Services	15.6	18.2
Retail trade	12.6	14.2
State and local government	12.6	12.6
Self-employed	6.8	6.6
Agriculture	6.8	4.4
Wholesale trade	5.2	5.0
Transportation	4.1	4.8
Finance, insurance, and real estate	3.8	5.0
Construction	3.7	4.1
Federal civilian	3.5	2.8
Federal military	1.6	2.3
Mining	0.4	1.0
Total <sup>2</sup>	100.0	100.0

<sup>1</sup> The forest products industry has three segments: (1) lumber and wood products (SIC 24), except mobile homes (SIC 2451); (2) wood furniture manufacturing (SIC 2511, 2512, 2517, 2521, 2541); and (3) paper and allied products (SIC 26).

<sup>2</sup> Sum of parts may not equal totals because of rounding.



## Components of the Economic Base

Along with total employment, there is another and perhaps more important way to judge an industry's contribution to Tennessee's economy. For the State's economy to grow and develop, it must attract new dollars so residents can buy goods and services produced elsewhere. The industries that export products and services beyond local boundaries (that is, to elsewhere in the State, to other States, and to the world) and bring in new dollars constitute the area's economic base. Generally speaking, most manufacturing employment is classified as economic base (or basic); service or residentiary employment (for example, barber shops, realty firms, schools, and local government) is primarily geared to producing for local needs. Some services may, however, be basic. Federal civilian employment provides national services (for example, ordnance and natural resource management) for all the Nation's citizens, and taxpayers outside Tennessee provide financial support for this activity. Federal civilian, therefore, qualifies as one of Tennessee's basic industries.

Residentiary employment and its earnings are supported by the economic base. Money flowing into a State for goods and services sold to businesses, governments, and households outside the State provide the income that reimburses wage earners and the self-employed for their services. This income is largely spent for locally available goods and services. The economic growth of an area is thus dependent on the success of its economic base; the residentiary activities—which serve businesses, government, and household residents of the State—enhance the business climate and the quality of life of these residents.

We used the excess employment and excess earnings techniques to identify the industries that comprise Tennessee's (or a sub-State district's) economic base. This approach accepts the national distribution of employment among industries and its earnings as the norm. Any industry with employment in excess of this norm is considered to be producing for export markets outside the State (or sub-State district) and is part of Tennessee's economic base, provided that the proportion of full-time employment and the productivity of this employment is the same as that for the rest of the Nation. Because of the large amount of part-time workers in farming, for example, the total earnings of this employment is used as an alternative measure of industry dependency. Although the percentage distribution of the total earnings differs sharply from the total employment distribution, the two measures yield consistent results in that earnings data adjust for the above-average level of part-time employment in a basic industry like farming.

In this study, the percentage of Tennessee's excess employment and earnings served as an indicator of the State's dependency on a particular industry for generating new dollars from outside the State (table 2 shows how excess employment and industry dependency indicators for Tennessee were calculated).



In 1980, nine industries accounted for 92.4 percent of the State's excess employment and 89.2 percent of the excess earnings--that is, its economic base (see tabulation below). The same industries accounted for a slightly larger share (93.8 percent) of excess employment and a slightly smaller share of excess earnings (85.2 percent) in 1970. In 1970, agriculture, for example, accounted for 31.6 percent of basic employment and 4.1 percent of basic earnings. The two percentages dropped to 24.6 and 3.9 percent, respectively. Manufacturing industries (textile, chemical, leather, forest and rubber products) on the other hand accounted for an increasingly larger share of the economic base. For employment, this share increased from 58.9 to 62 while it increased to an even larger percentage in earnings--70.4 to 74.6. The chemical and allied products industry was the largest gainer in market share among the manufacturers.

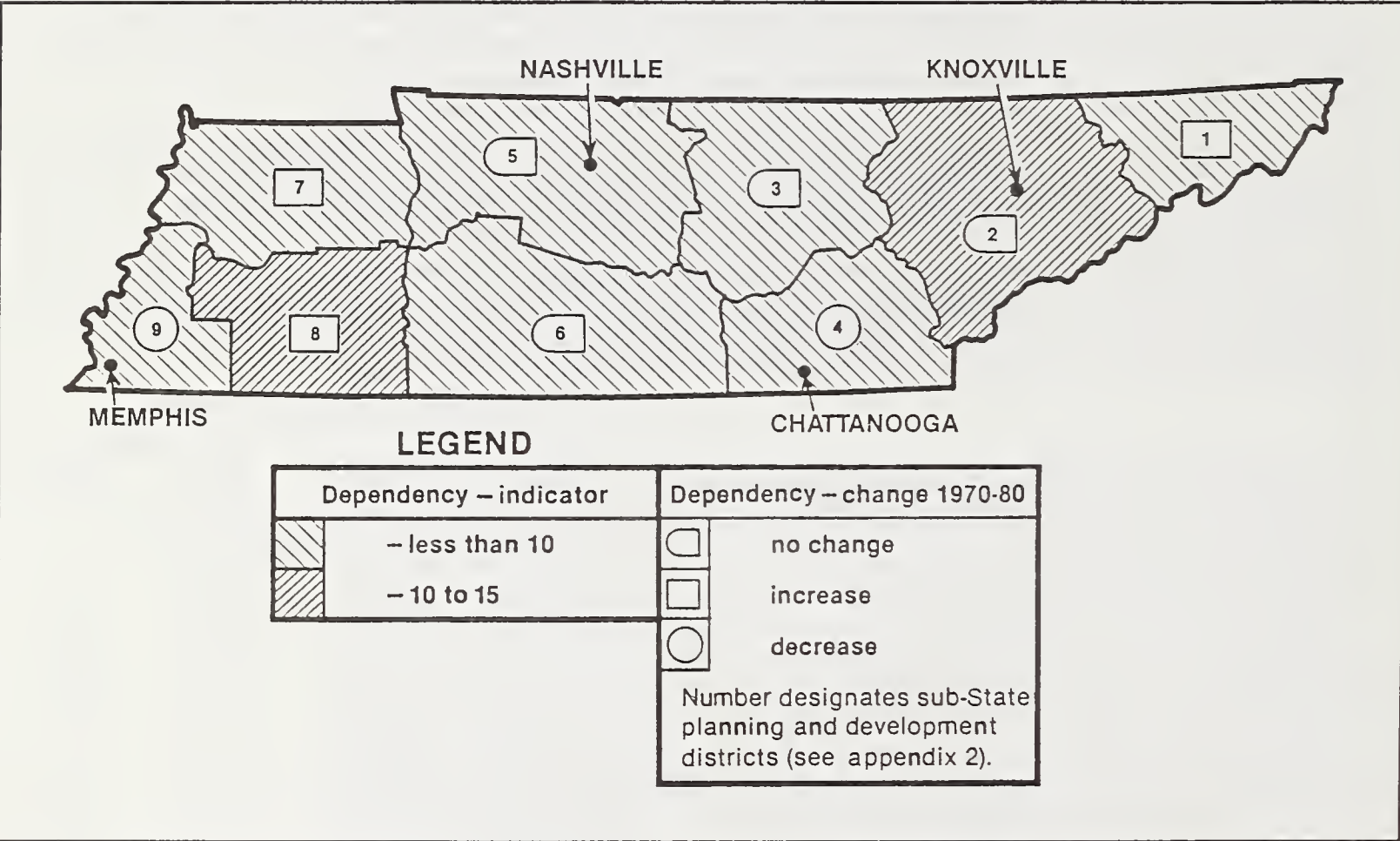
Federal civilian employment, which did not qualify as a basic industry in 1970, accounted for 6.2 percent of basic employment by the end of the decade. During the 1970's, the importance of the forest products industry increased slightly.

Both wholesale trade and trucking and warehousing qualify as basic industries. This phenomenon reflects Tennessee's role as a major regional trade and transportation center.

Economic base industries	Dependency indicator			
	1970		1980	
	EMP	EARN	EMP	EARN
	(Percent of economic base)			
Agriculture	31.6	4.1	24.6	3.9
Textile	24.8	20.0	22.4	15.2
Chemical and allied products	18.0	31.9	15.8	26.7
Federal civilian	—	—	6.2	14.2
Leather and leather products	7.2	7.2	6.1	5.0
Forest products industry	7.6	8.6	7.8	7.7
Rubber and miscellaneous products	1.3	2.7	3.7	5.6
Trucking and warehousing	1.7	4.2	3.6	7.4
Wholesale trade	1.6	6.5	2.2	3.5
Subtotal	93.8	85.2	92.4	89.2
All other basic industries	6.2	14.8	7.6	10.8
Total	100.0	100.0	100.0	100.0

**Geographical  
Importance of the Forest  
Products Industry**

The contribution of the forest products industry to Tennessee's economic base differed among sub-State districts (see appendix 2 for a list of counties by district). In district 6, the forest products industry accounted for only 1 percent of the economic base; in district 2, it accounted for 12 percent. Four districts—2, 4, 8, and 9—accounted for 75 percent of the basic employment in the State's forest products industry. A significant portion of this basic employment is associated with secondary processing in metropolitan areas.

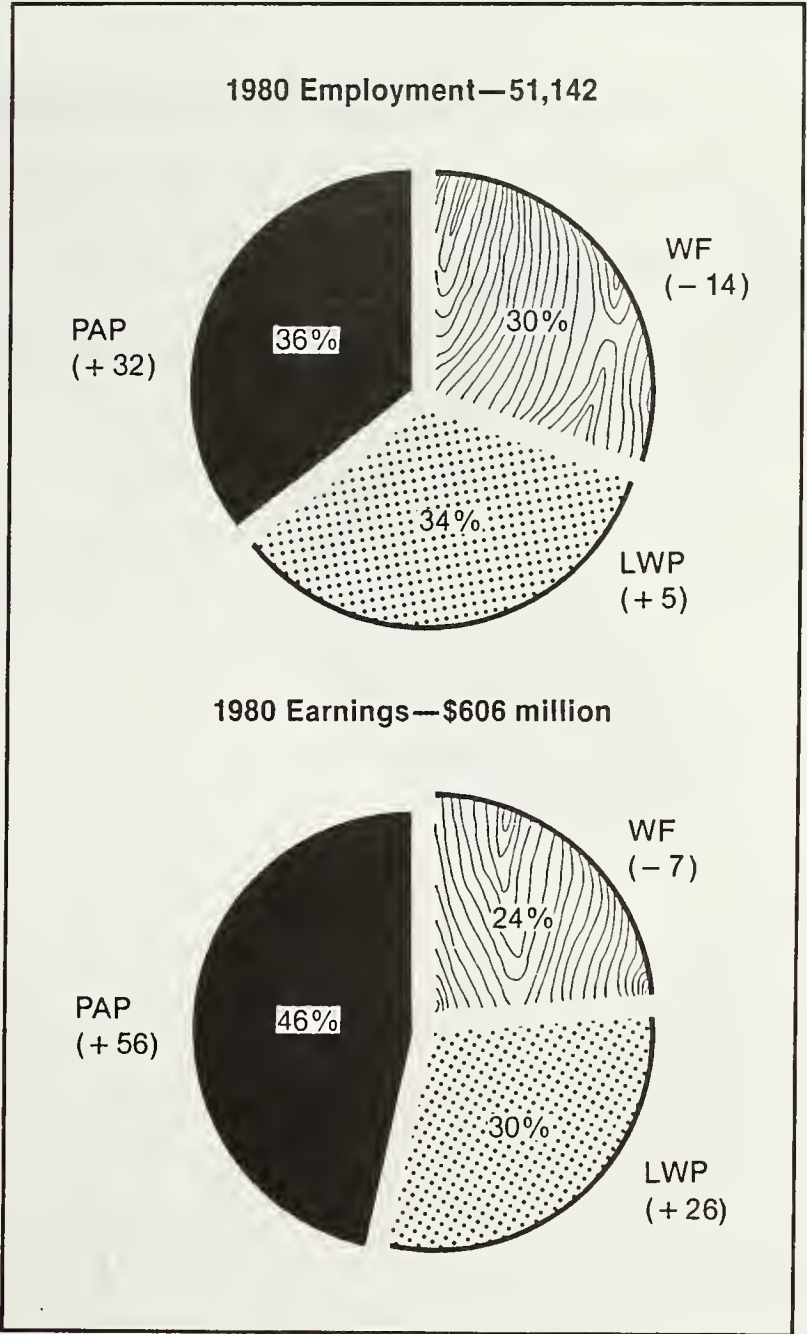


Source: Sub-State estimates for 1970 and 1980 were derived from unpublished county data series provided by the U.S. Department of Commerce, Regional Economic Information System, Washington, DC, and from the Department's *County Business Patterns*. The numbers designate sub-State districts corresponding to the geographical classification of counties as shown in appendix 2.

**Composition of the  
Forest Products Industry**

Tennessee's forest products industry is comprised of paper and allied products, lumber and wood products (not including mobile homes), and wood furniture manufacturing. Employment was almost equally distributed among the three segments in 1980, but paper and allied products accounted for nearly half of the total earnings in the State's forest products industry.

Although employment decreased in the wood furniture segment between 1970 and 1980, it increased in the other two segments. The growth in employment in the paper and allied products segment is particularly noteworthy. Earnings in wood furniture manufacturing, like employment, decreased between 1970 and 1980. Meanwhile, the other two segments experienced sizable increases in earnings.



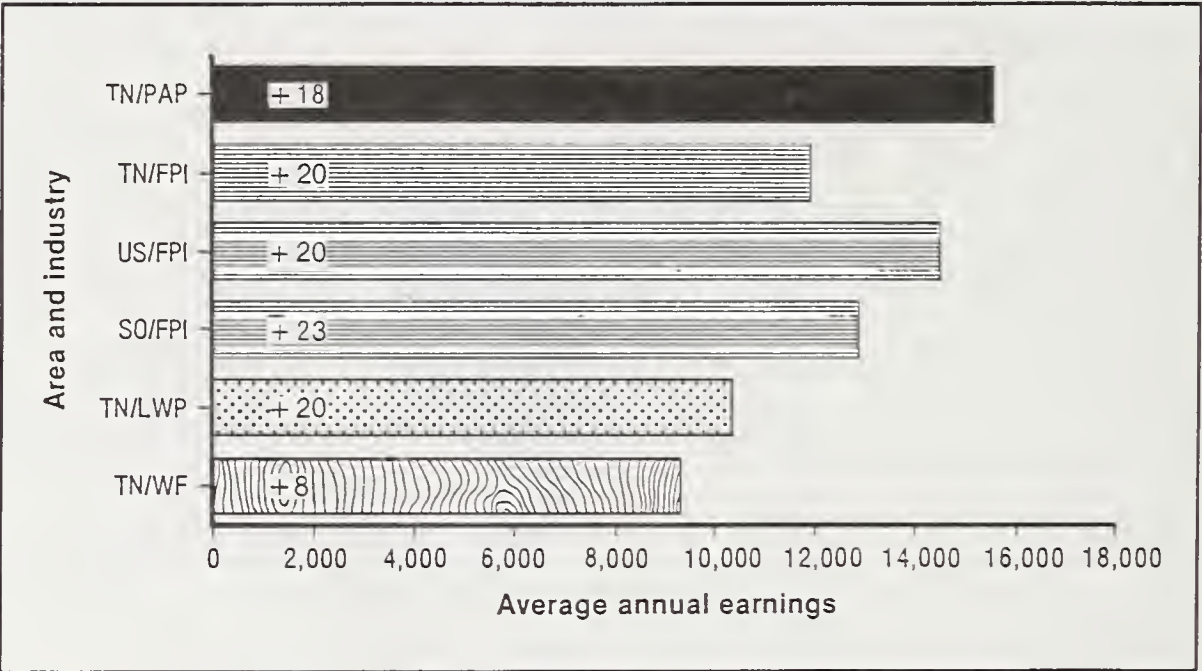
Numbers in parentheses show percentage of change from 1970 to 1980.



**Average Annual  
Earnings per Worker**

Average annual 1980 earnings per worker in paper and allied products were greater than were earnings in the other two segments of the forest products industry. Higher average skill levels, greater capital investment per worker, and unions account for this difference. At the State level, earnings in the wood furniture industry were about 60 percent of those for paper and allied products and were significantly below the average for all forest products industries in the South and the United States.

The rate of growth in average earnings was about the same for Tennessee's forest products industry as for the Nation but somewhat less than the average for the South. The rate of change for wood furniture was considerably less than that of the forest products industry in the Nation and the South.

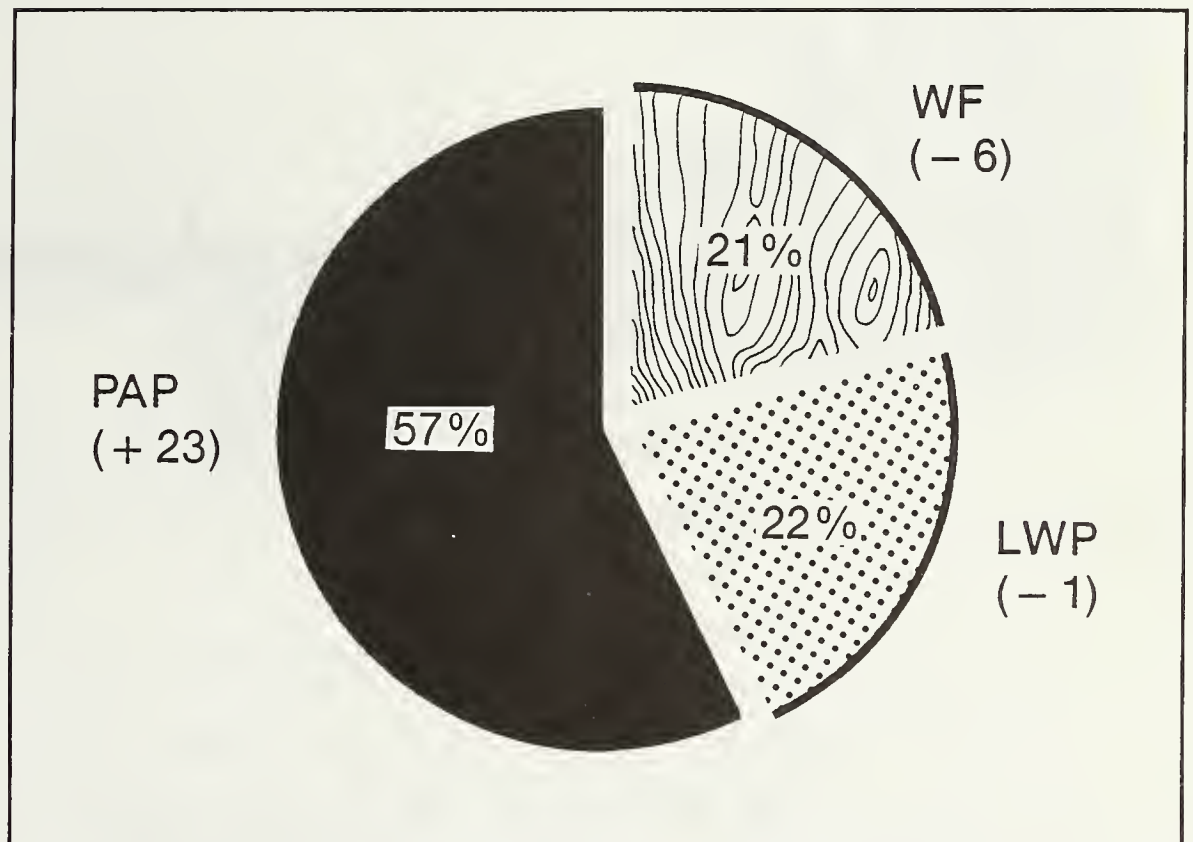


Numbers in bars show percentage of change from 1970 to 1980.

### Value Added by the Forest Products Industry

Value added by manufacturing represents income payments made directly to workers and business owners; it is equal to the value of shipments less the cost of materials, parts, supplies, fuel, goods purchased for retail, electric energy, and contract work. Value of shipments includes goods and services provided by other industries. Value added includes only the economic contributions of the State's forest products industry. Consequently, value added by manufacturing is considered a better monetary gauge of the relative economic importance of a manufacturing industry. In 1977, paper and allied products had the largest share of the \$1.1 billion of value added by Tennessee's forest products industry.

In addition to having above-average growth in employment, the forest products industry increased in value added between 1972 and 1977. The value added increased by 10 percent but only on the strength of paper and allied products; value added by the wood furniture and the lumber and wood products segments actually decreased.



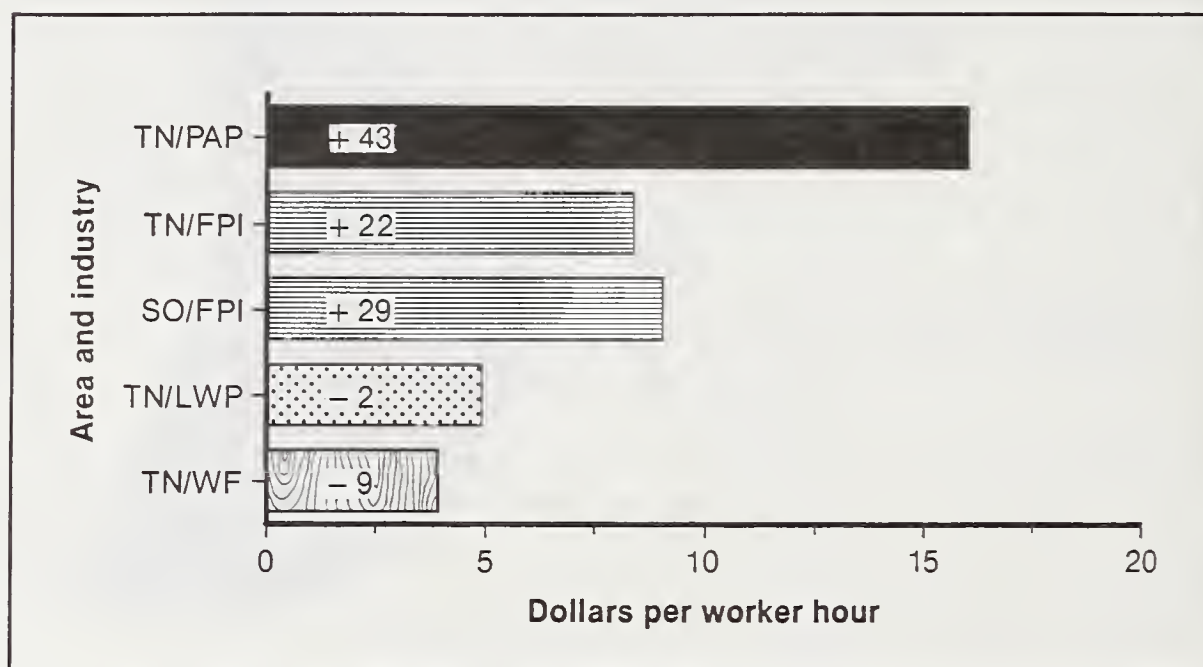
Numbers in parentheses show percentage of change from 1972 to 1977.

## Capital Productivity

Increases in productivity are necessary for an industry to remain competitive. Productivity of an industry is measured in terms of value added minus payroll per worker hour—VAMP (see table 3 for an explanation of how productivity was calculated for Tennessee's forest products industry). This measure of productivity represents profits before taxes and adjusts for wide differences in payroll among industries.

Paper and allied products is more capital intensive than the other segments of the industry and in the past attracted considerable investment in new facilities and equipment. During the mid-1970's, its productivity consequently increased despite significantly higher and increasing labor costs. Furthermore, this segment exhibited a significantly larger gain in productivity than was average for the South.

Paper and allied products had, by far, the highest productivity in Tennessee's forest products industry. Productivity per worker hour was more than twice the average for the State's forest products industry. Productivity in the wood furniture and lumber and wood products segments, which was very low to begin with, decreased between 1972 and 1977.



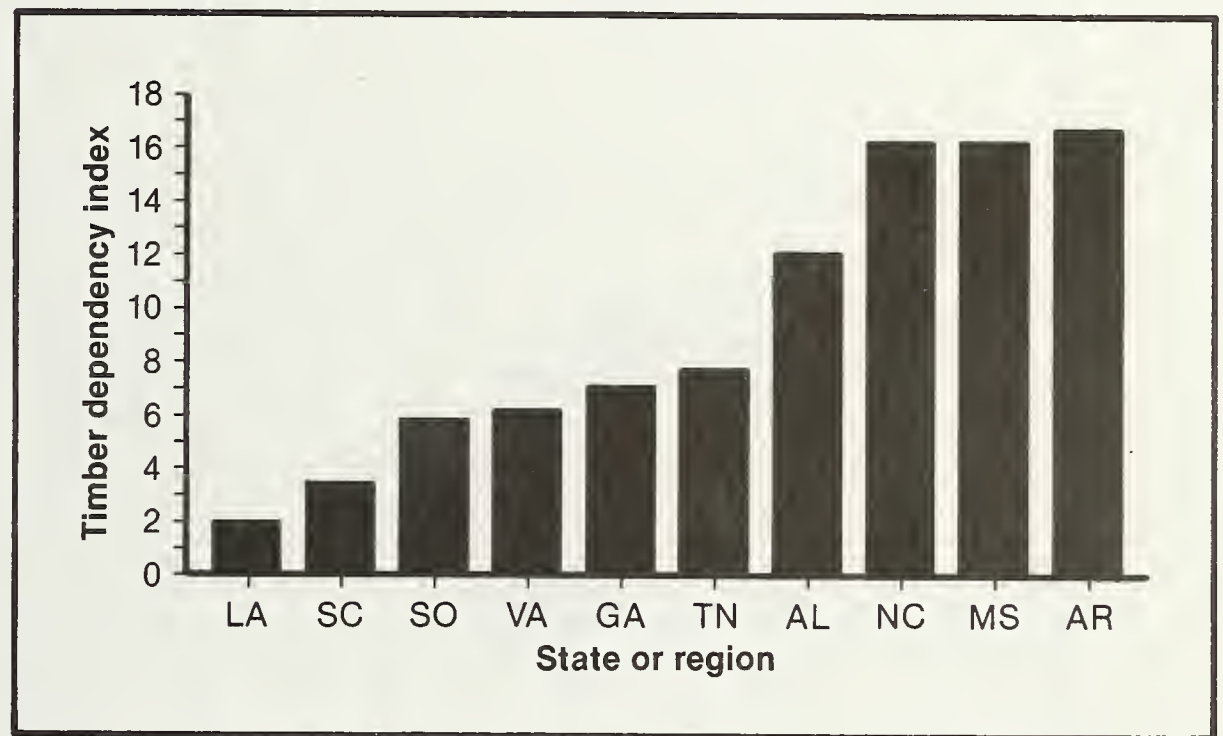
Numbers in bars show percentage of change from 1972 to 1977.



## The Forest Products Industry in the South

### Importance of the Industry Across the South

The dependency indicators suggest that in 1980 all but four States in the South manufactured forest products in excess of statewide needs. Florida, Kentucky, Oklahoma, and Texas were not self-sufficient in forest products; that is, these States imported more forest products than they exported. Consequently, on net balance, their respective forest products industries did not generate new dollars from the outside. In three States—Arkansas, Mississippi, and North Carolina—the forest products industry accounts for about one of six basic employees. Tennessee ranks fifth with about 1 of every 12 basic employees dependent on the forest products industry.



## **Industry Composition**

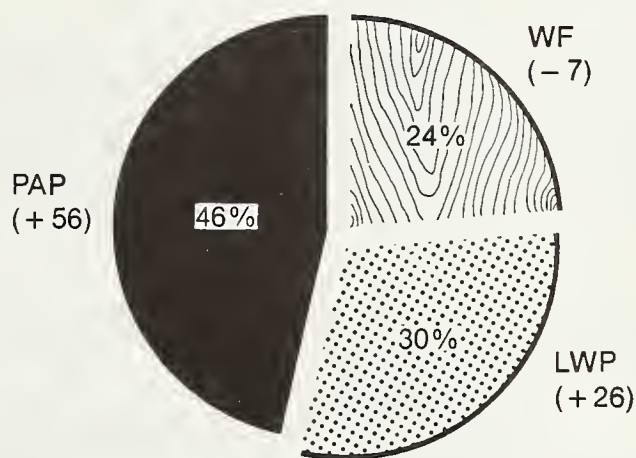
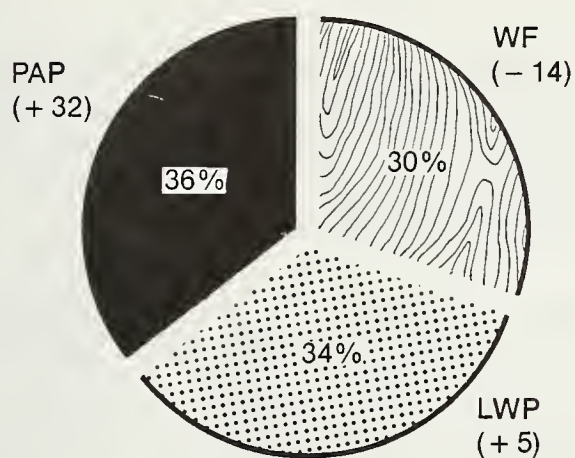
Both the paper and allied products and the wood furniture segments accounted for larger shares of 1980 employment and earnings in Tennessee's forest products industry than they did for the South. During the 1970's, employment and earnings in the pulp and allied products segment increased at a much faster rate in Tennessee than in either the South or the Nation.

Wood furniture is more prominent in Tennessee than in the South and the Nation; but unlike the South and the Nation, earnings and employment in this segment declined in Tennessee.

## TENNESSEE

1980 Employment—51,142

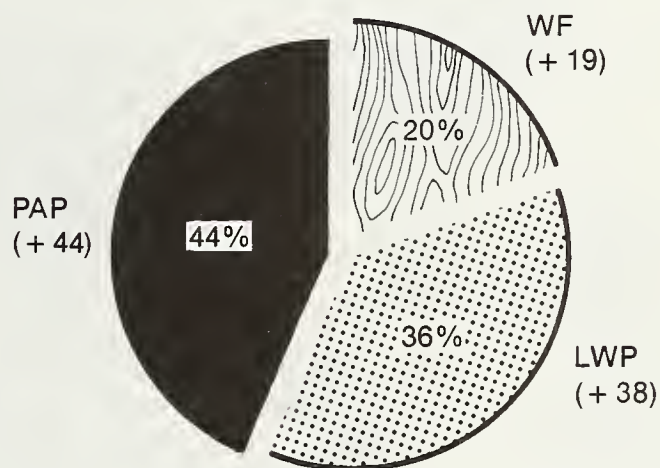
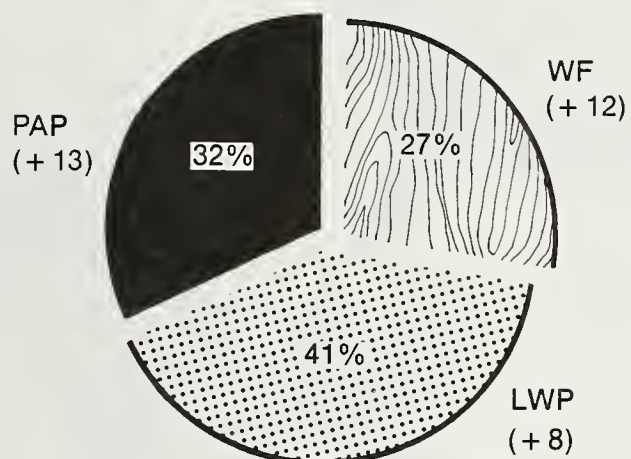
1980 Earnings—\$606 million



## THE SOUTH

1980 Employment—620,567

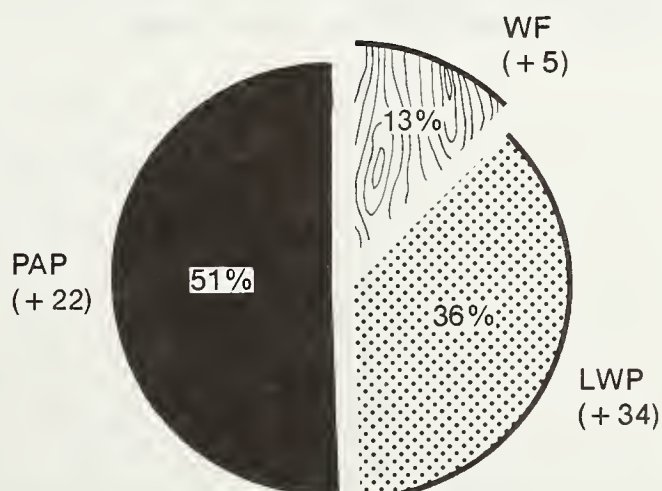
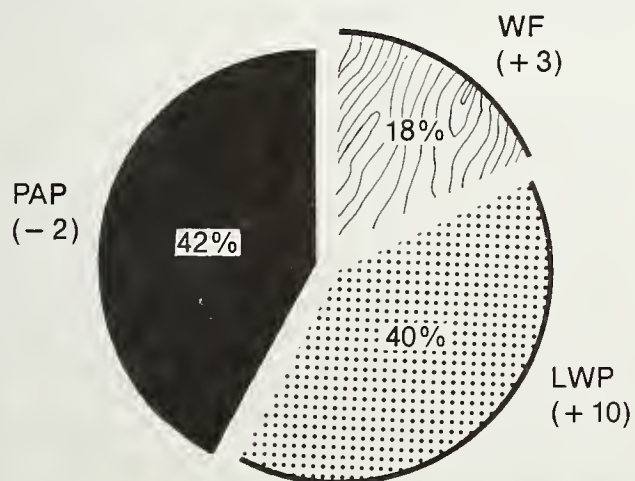
1980 Earnings—\$7.96 billion



## UNITED STATES

1980 Employment—1,634,000

1980 Earnings—\$23.65 billion

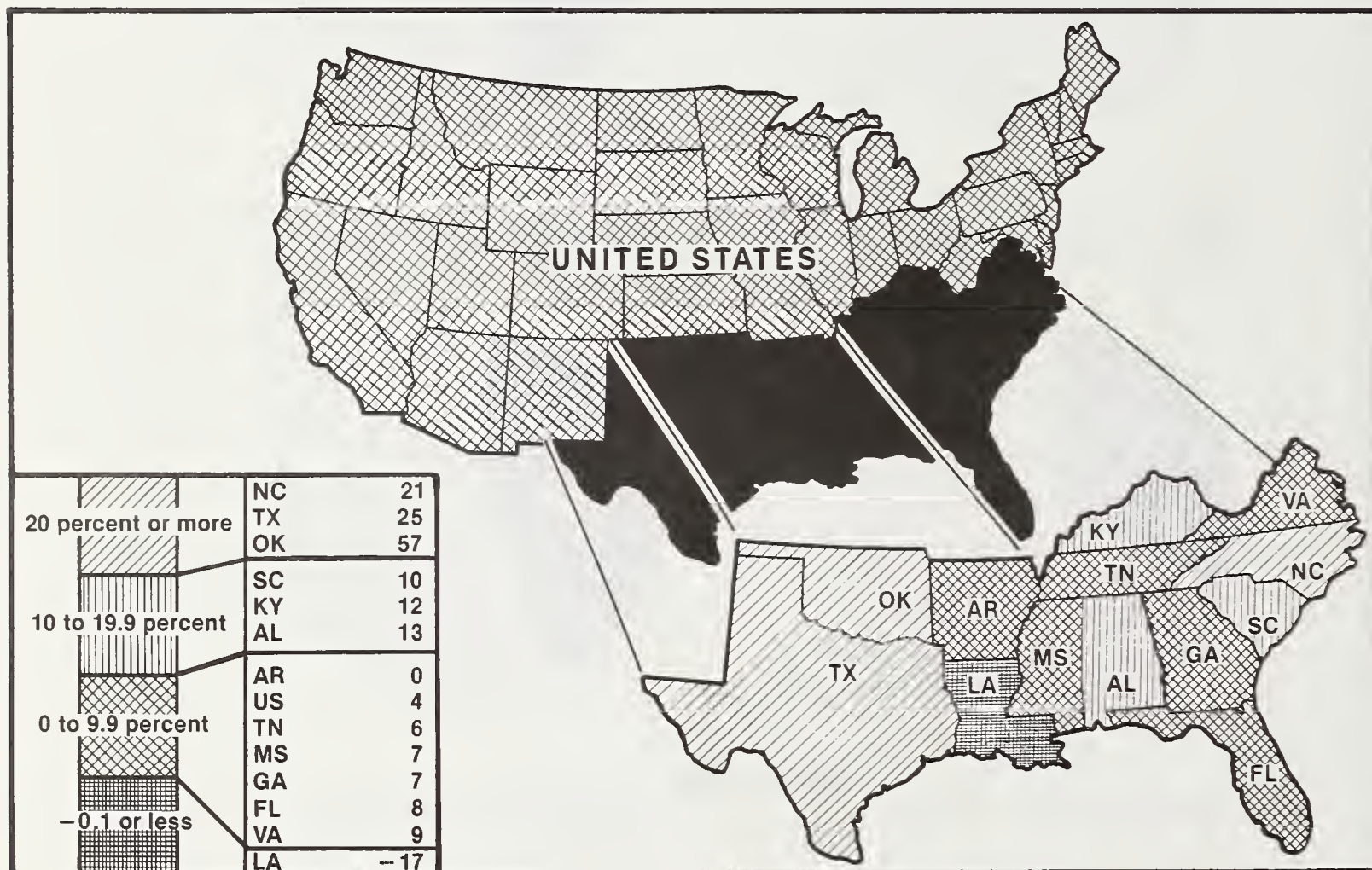


Numbers in parentheses show percentage of change from 1970 to 1980.



## Growth of Employment

With the exceptions of Arkansas and Louisiana, employment in the forest products industry in each of the Southern States grew faster than did the U.S. counterpart. Between 1970 and 1980, employment in Oklahoma and Texas grew faster than the all-industry average of 22.3 percent. Between 1970 and 1980, employment in the forest products industry in Tennessee increased by more than 2,500.

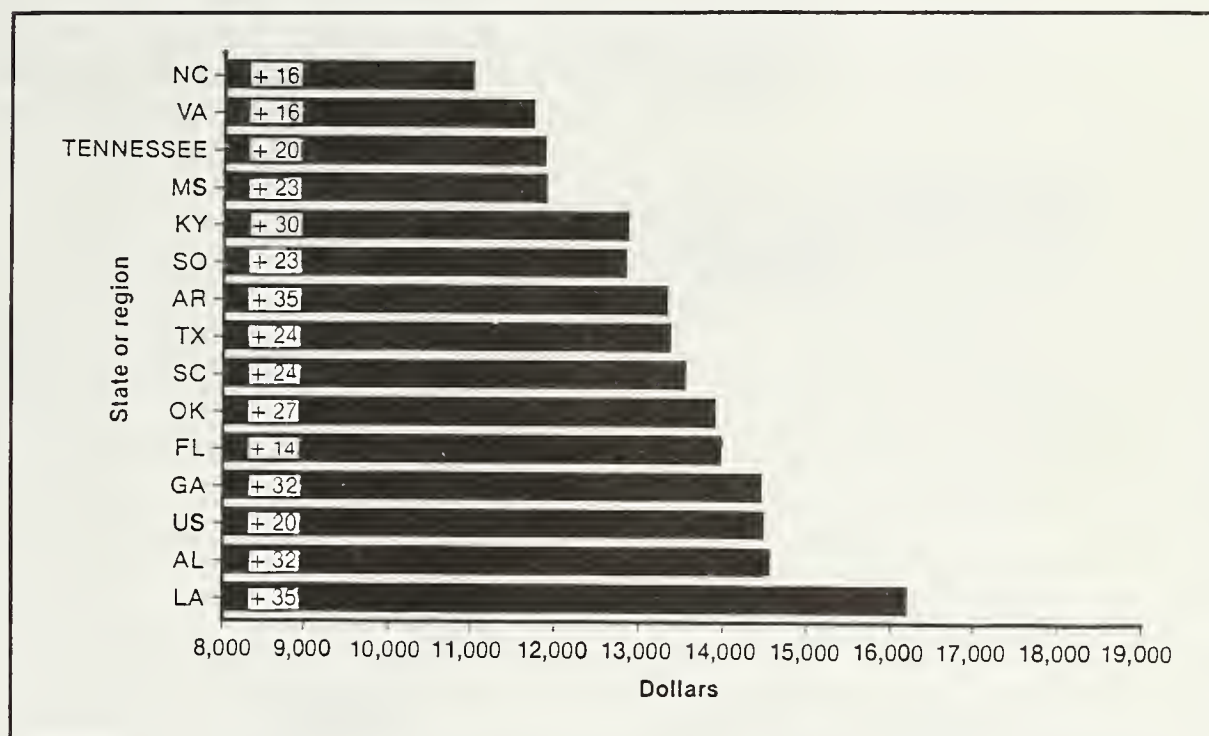


## Average Annual Earnings

Average annual earnings per worker in the forest products industry differed significantly by State in 1980. About \$5,000 separated the State with the highest (Louisiana) from the State with the lowest (North Carolina). Pulp and allied products manufacturing, which has traditionally paid higher wages than have other segments of the forest products industry, dominated Louisiana's forest products industry. Wood furniture, which has paid lower average wages, dominated North Carolina's industry.

Average annual earnings in the forest products industry in Tennessee were slightly below the average for all States in the South but significantly below the average for the United States. The increase in earnings was nearly the same for Tennessee, the South, and the Nation.

Generally speaking, paper and allied products dominated the forest products industry in the States with the highest average annual earnings. This relation reflects higher job skills and unions in pulp and paper manufacturing. Wages, by and large, were the lowest in States where the labor-intensive wood furniture industry was more important.



Numbers in bars show percentage of change from 1970 to 1980.

## **Shift in Employment and Earnings**

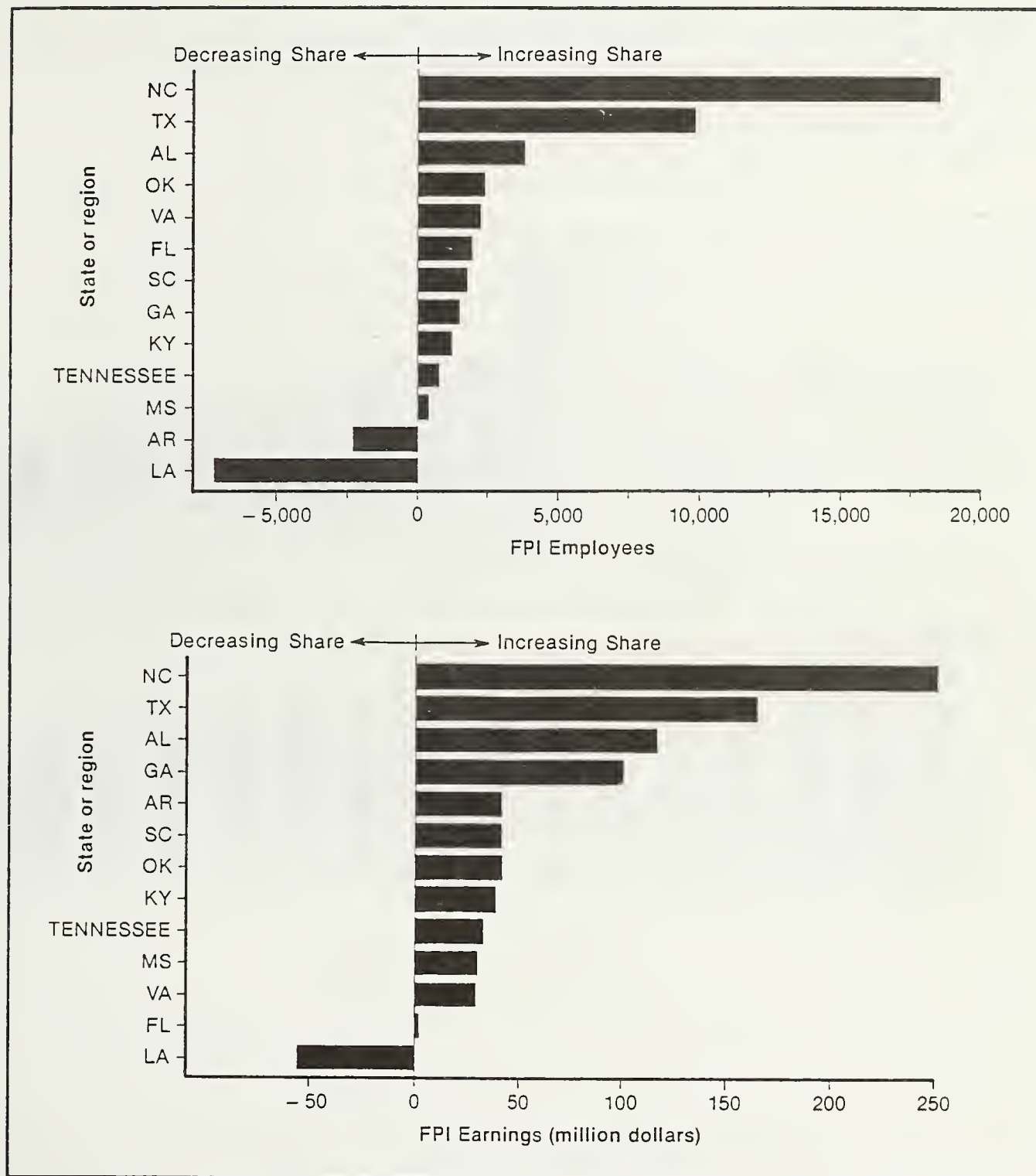
Between 1970 and 1980, total employment in the Nation's forest products industry remained constant; with the exception of Louisiana, it increased in every Southern State. All Southern States except Arkansas and Louisiana increased their share of the Nation's forest products industry employment, and all but Louisiana increased their share of earnings.

The regional shift shows how much more or less employment and earnings a State would have had in the forest products industry in 1980 had it grown at the national rate. Tennessee, for example, had nearly 750 more employees in 1980 than it would have had if its forest products industry had grown at the national rate.

Increased shares of employment and earnings reflect the comparative advantage the South's forest products industry enjoyed over competitors elsewhere. Tennessee was one of the majority of Southern States in which the forest products industry improved its competitive position during the 1970's.

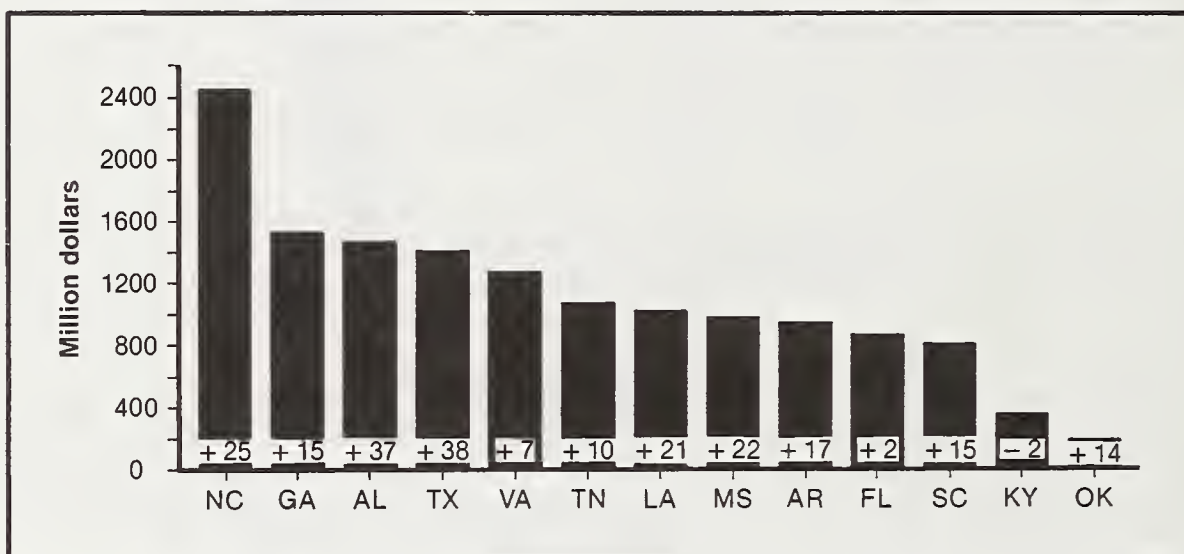
Several factors (for example, relatively lower labor costs, lower raw materials costs, and closer proximity to markets) might account for a State's comparative advantage, although adverse trends in one factor need not reduce a region's advantage. For instance, increasing labor costs need not adversely affect the South's comparative advantage if increased capital or labor productivity offsets higher labor costs.





## Value Added by the Forest Products Industry

In 1977, North Carolina led the South in value added by the forest products industry. Tennessee was sixth. Texas not only was one of the leading States in total value added but also led the South in the change in value added between 1972 and 1977. One State, Kentucky, produced less value added in 1977 than in 1972.



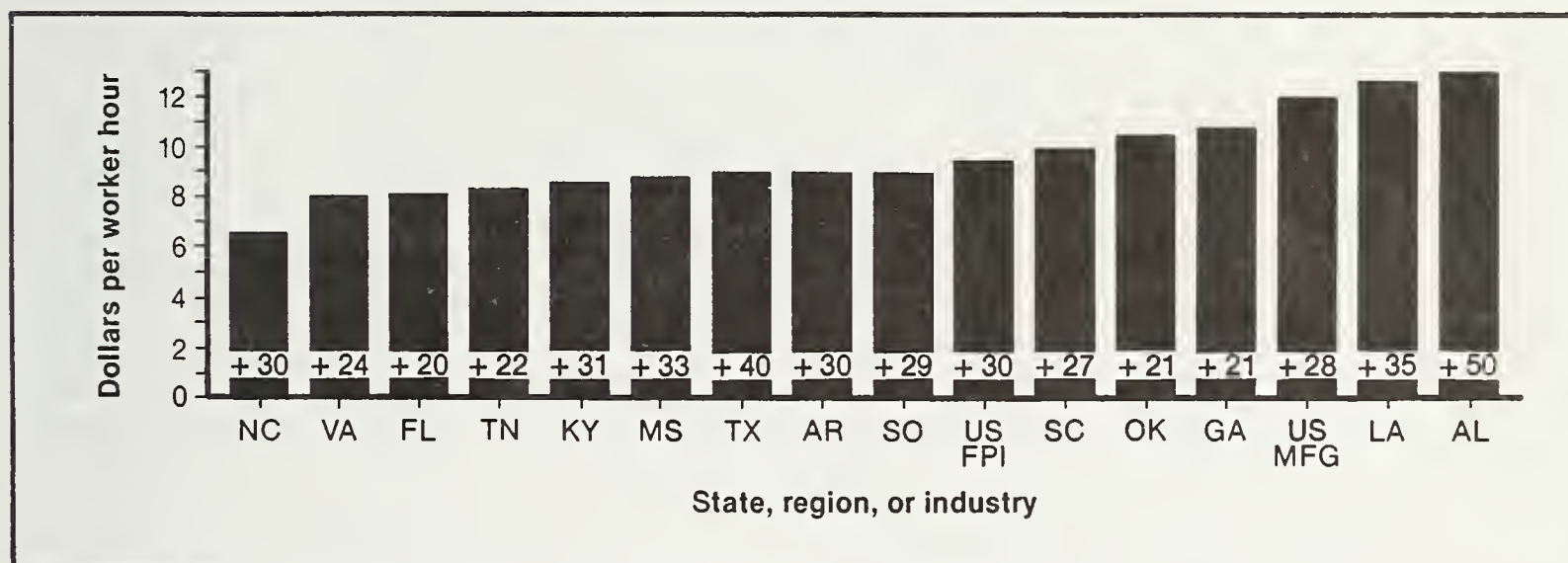
Numbers in bars show percentage of change from 1972 to 1977.

## Capital Productivity

Paper and allied products, which is more capital-intensive and therefore more susceptible to technological change than are other segments of the forest products industry, exhibited the highest productivity within the forest products industry. Wood furniture, on the other hand, is the most labor-intensive of the three. North Carolina produced more value added than any other State in the South, but the productivity of its forest products industry in 1977 was the lowest, reflecting the dominant role of labor-intensive wood furniture manufacturing in North Carolina.

Increases in productivity exceeded increases in payroll per worker between 1972 and 1977 for all the Southern States. This relation is, in part, responsible for the South's comparative advantage in the forest products industry.

In Tennessee, growth of productivity in the paper and allied products segment (43 percent) far exceeded the average for the forest products industry and the average for all industries in the Nation in 1977. But the productivity of the other two segments declined. Productivity of Tennessee's forest products industry was therefore slightly below the average for the 13 Southern States. Growth in productivity of Tennessee's forest products industry exceeded that of only three of these States.



Numbers in bars show percentage of change from 1972 to 1977.



## Acknowledgment

Many helpful suggestions of several reviewers were incorporated in this research report. This project was funded in part by USDA Forest Service, Resource Program and Assessment Staff, and State and Private Forestry, Area Planning and Development, State Planning for Forest Resources.

## Appendix 1 Tables

**Table 1—Total labor and proprietorial employment and income, by industry, Tennessee, 1980<sup>1</sup>**

Industry number	Industry	Employees	Total income
		<i>Number</i>	<i>Thousand 1977 dollars<sup>2</sup></i>
Wage and salary			
1	Agriculture	25,055	289,729
2	Agricultural services, forestry, and fisheries	6,881	56,794
3	Coal mining	4,184	98,929
4	Oil and gas extraction	686	11,696
5	Metal mining	1,607	27,225
6	Nonmetallic minerals	3,166	40,215
7	Construction	79,673	1,116,747
8	Food and kindred products	38,517	511,845
9	Tobacco	1,479	21,466
10	Textile mill production	26,269	249,988
11	Apparel and other textiles	69,089	481,495
12	Paper and allied products	18,197	281,845
13	Printing and publishing	23,930	273,865
14	Chemical and allied products	59,659	1,086,806
15	Petroleum refining	575	15,132
16	Rubber and miscellaneous plastics	23,295	324,067
17	Leather and leather products	19,262	169,946
18	Lumber and wood products excluding mobile homes	17,433	179,751
19	Mobile homes	1,155	11,919
20	Wood furniture	15,512	144,244
21	Other furniture and fixtures	5,725	53,236
22	Stone, clay, and glass products	14,695	221,914
23	Primary metals	17,929	338,946
24	Fabricated metals	32,965	444,623
25	Machinery, excluding electrical	35,582	508,198
26	Electrical machinery	40,191	475,469
27	Transportation equipment, excluding motor vehicles	10,034	165,586
28	Motor vehicles	11,964	186,981
29	Instruments and related equipment	5,904	70,833
30	Miscellaneous manufacturing	11,215	114,713
31	Railroad transportation	10,970	212,427
32	Trucking and warehousing	34,032	576,783
33	Local transit	4,029	50,779
34	Air transportation	7,889	154,607

See footnotes at end of table.

**Table 1—Total labor and proprietorial employment and income, by industry, Tennessee, 1980<sup>1</sup> (continued)**

Industry number	Industry	Employees	Total income
		<i>Number</i>	<i>Thousand 1977 dollars<sup>2</sup></i>
Wage and salary			
35	Pipeline transportation	45	1,009
36	Transportation services	1,658	31,963
37	Water transportation	1,335	16,746
38	Communications	23,352	402,723
39	Electrical, gas, and sanitation services	4,201	78,143
40	Wholesale trade	110,495	1,555,598
41	Retail trade	268,218	2,071,328
42	Banking	26,187	28,3476
43	Other credit agencies	13,783	217,852
44	Insurance	27,672	420,202
45	Real estate and combinations	13,213	163,271
46	Hotel and other lodging	22,795	162,801
47	Personal, miscellaneous business, and repair services	66,065	683,392
48	Auto repair service	9,466	120,577
49	Amusement	11,206	87,954
50	Motion pictures	2,523	16,806
51	Private households	46,061	116,507
52	Medical and other health	90,360	1,257,103
53	Private education	25,807	227,591
54	Nonprofit organizations	41,804	257,667
55	Miscellaneous services	17,555	456,647
56	Federal civilian	74,204	1,181,170
57	Federal military	33,364	167,219
58	State and local government	268,727	2,315,093
Proprietorial			
59	Nonfarm proprietors	144,542	1,456,318
60	Farm Proprietors	112,792	193,796
Total		2,210,120	22,833,608

1 Source of data for this table for Tennessee, other States of the South, and the United States: unpublished data, U.S. Department of Commerce, Regional Economics Measurements Division, Regional Economic Information System (REIS), Washington, DC, 1982. Unpublished data used by the U.S. Department of Commerce in preparing their *County Business Patterns* (CBP) series on employment and payroll were used to differentiate wood-related from nonwood-related employment and earnings. For example, CBP data were used to separate mobile homes (no. 19, above) from the lumber and wood products (no. 18) industry. Wood furniture (no. 20) was similarly separated from other furniture and fixtures (no. 21).

2 The Personal Consumption Expenditures (PCE) deflator, 1977 = 100, was used to deflate nominal dollars.

**Table 2—Calculation of the 1980 dependency indexes for Tennessee**

(In percent)

Industry	Employment		Tennessee excess employment <sup>1</sup>	Dependency index <sup>2</sup>
	Tennessee	United States		
Agriculture	1.38	1.46	—	—
Agricultural services, forestry, and fisheries	.38	.62	—	—
Farm proprietors	6.19	3.03	3.16	24.28
Coal mining	.23	.27	—	—
Oil and gas extraction	.04	.60	—	—
Metal mining	.09	.11	—	—
Nonmetallic minerals	.17	.14	.04	.29
Construction	4.37	4.74	—	—
Food and kindred products	2.11	1.87	.25	1.89
Tobacco	.08	.07	.01	.05
Textile mill production	1.44	.93	.51	3.93
Apparel and other textiles	3.79	1.39	2.41	18.48
Paper and allied products	1.00	.76	.24	1.84
Printing and publishing	1.31	1.37	—	—
Chemical and allied products	3.28	1.22	2.06	15.79
Petroleum refining	.03	.22	—	—
Rubber and miscellaneous plastics	1.28	.80	.48	3.71
Leather and leather products	1.06	.26	.80	6.13
Lumber and wood products, excluding mobile homes	.96	.71	.25	1.90
Mobile homes	.06	.05	.01	—
Wood furniture	.85	.32	.53	4.06
Other furniture and fixtures	.31	.19	.13	.97
Stone, clay, and glass products	.81	.73	.08	.59
Primary metals	.98	1.26	—	—
Fabricated metals	1.81	1.77	.04	.28
Machinery, excluding electrical	1.95	2.73	—	—
Electrical machinery	2.21	2.31	—	—
Transportation equipment, excluding motor vehicles	.55	1.21	—	—
Motor vehicles	.66	.87	—	—
Instruments and related equipment	.32	.77	—	—
Miscellaneous manufacturing	.62	.47	.15	1.15
Railroad transportation	.60	.58	.02	.14
Trucking and warehousing	1.87	1.40	.47	3.59
Local transit	.22	.29	—	—
Air transportation	.43	.50	—	—
Pipeline transportation	—	.02	—	—
Transportation services	.09	.22	—	—
Water transportation	.07	.23	—	—
Communications	1.28	1.48	—	—
Electrical, gas, and sanitation services	.23	.90	—	—
Wholesale trade	6.07	5.79	.28	2.15
Retail trade	14.73	16.50	—	—
Banking	1.44	1.72	—	—
Other credit agencies	.76	.99	—	—

See footnotes at end of table.



**Table 2—Calculation of the 1980 dependency indexes for Tennessee (continued)**  
(In percent)

Industry	Employment		Tennessee excess employment <sup>1</sup>	Dependency index <sup>2</sup>
	Tennessee	United States		
Insurance	1.52	1.89	—	—
Real estate and combinations	.73	1.16	—	—
Hotel and other lodging	1.25	1.20	.05	.40
Personal, miscellaneous business, and repair services	3.63	4.69	—	—
Auto repair service	.52	.63	—	—
Amusement	.62	.84	—	—
Motion pictures	.14	.24	—	—
Medical and other health	4.96	5.71	—	—
Private education	1.42	1.47	—	—
Nonprofit organizations	2.30	3.01	—	—
Miscellaneous services	.96	1.63	—	—
Federal civilian	4.07	3.27	.80	6.17
Federal military	1.83	2.68	—	—
Nonfarm proprietors	7.94	7.66	.27	2.10
Total <sup>3</sup>	100.00	100.00	13.04	100.00

<sup>1</sup>Tennessee employment minus U.S. employment. Figures may not be exactly equal to Tennessee minus U.S. because of rounding. Dashes signify no excess employment.

<sup>2</sup> Individual industry excess employment expressed as a percentage of Tennessee's total excess employment (sum of column 4).

<sup>3</sup> Sum of parts may not equal totals because of rounding.

**Table 3 —Value added, hours worked, payroll, and capital productivity,<sup>1</sup>  
Tennessee forest products industry, 1977<sup>2</sup>**

Industry	Value added	Payroll	Hours worked	Productivity	Productivity change, 1972-77
	-- \$Million --		Million	\$VAMP per hour	Percent
Lumber and wood products	24.5	12.3	24.5	4.91	-1.57
Wood furniture	223.2	124.3	25.3	3.91	-9.08
Paper and allied products	618.4	211.8	25.5	15.95	+43.39

<sup>1</sup> Productivity equals value added minus payroll (VAMP) divided by hours worked. For a discussion of VAMP, see W. Charles Sawyer and Joseph A. Ziegler. 1980. "The use of VAMP shift as a predictive model." Unpublished paper presented at the annual meeting of the Western Regional Science Association, Monterey, California.

<sup>2</sup> Source: U.S. Bureau of the Census, Census of Manufactures, for 1972 and 1977, Tennessee and the United States, available in 1976 and 1980, respectively. In the few instances where data were not available for some subindustry segments, the distribution of the number of establishments was used to estimate nondisclosures.

## Appendix 2

### Tennessee Counties by Sub-State Planning and Development Districts

District code	Counties
1	Carter, Greene, Hancock, Hawkins, Johnson, Sullivan, Unicoi, Washington
2	Anderson, Blount, Campbell, Claiborne, Cocke, Grainger, Hamblen, Jefferson, Knox, Loudon, Monroe, Morgan, Roane, Scott, Sevier, Union
3	Cannon, Clay, Cumberland, DeKalb, Fentress, Jackson, Macon, Overton, Pickett, Putnam, Smith, Van Buren, Warren, White
4	Bledsoe, Bradley, Grundy, Hamilton, Marion, McMinn, Meigs, Polk, Rhea, Sequatchie
5	Cheatham, Davidson, Dickson, Houston, Humphreys, Montgomery, Robertson, Rutherford, Stewart, Sumner, Trousdale, Williamson, Wilson
6	Bedford, Coffee, Franklin, Giles, Hickman, Lawrence, Lewis, Lincoln, Marshall, Maury, Moore, Perry, Wayne
7	Benton, Carroll, Crockett, Dyer, Gibson, Henry, Lake, Obion, Weakley
8	Chester, Decatur, Hardeman, Hardin, Haywood, Henderson, Madison, McNairy
9	Fayette, Lauderdale, Shelby, Tipton

**Maki, Wilbur R.; Schallau, Con H; Foster, Bennett B.; Redmond, Clair H.**  
1987. Tennessee's forest products industry: performance and contribution to the State's economy, 1970 to 1980. Res. Pap. PNW-RP-386. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 22 p.

The forest products industry is one of Tennessee's basic industries; in 1980, for example, it accounted for about 1 of every 12 basic jobs. Furthermore, Tennessee was one of the majority of Southern States in which the forest products industry improved its competitive position during the 1970's. In 1977, productivity growth of the paper and allied products segment far exceeded the average for the forest products industry as well as the average for all industries.

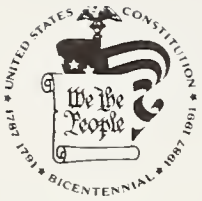
Keywords: Forest products industries, economics (forest products industries), employment (forest products industries), Tennessee.

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